

~~1. A method of switching optical transmission lines for a transmitter and a receiver~~  
comprising:

transmitting first optical signals on a first optical transmission line between a first transmitter and a first receiver;

5 transmitting second optical signals on a second optical transmission line between a second transmitter and a second receiver;

detecting a fault in the first optical transmission line;

isolating the second optical transmission line so as to have no traffic on the second optical transmission line; and

10 switching the first transmitter and the first receiver to the isolated second optical transmission line.

2. The method of switching optical transmission lines according to claim 1 further comprising:

15 switching the second transmitter and the second receiver to the first optical transmission line, the second optical signals being low priority data; and reversing the isolated second optical transmission line.

3. The method of switching optical transmission lines according to claim 2 further comprising:

20 transmitting third optical signals in an opposite direction to that of the first optical signals on a third optical transmission line between a third transmitter and a third receiver;

transmitting fourth optical signals in an opposite direction to that of the second optical signals on a fourth optical transmission line between a fourth transmitter and a fourth receiver;

25 isolating the fourth optical transmission line so as to have no traffic on the fourth optical transmission line;

switching the third transmitter and the third receiver to the isolated fourth optical transmission line;

switching the fourth transmitter and the fourth receiver to the third optical transmission line subsequent to switching the third transmitter and the third receiver to the isolated fourth optical transmission line; and

reversing the isolated fourth optical transmission line.

4. The method of switching optical transmission lines according to claim 2 further comprising:

transmitting third optical signals in an opposite direction to that of the first optical signals on a third optical transmission line between a third transmitter and a third receiver; transmitting fourth optical signals in an opposite direction to that of the second optical signals on a fourth optical transmission line between a fourth transmitter and a fourth receiver; isolating the fourth optical transmission line so as to have no traffic on the fourth optical transmission line simultaneously as the second optical transmission line is isolated; switching the third transmitter and the third receiver to the isolated fourth optical transmission line simultaneously as the first transmitter and the first receiver are switched to the isolated second optical transmission line;

switching the fourth transmitter and the fourth receiver to the third optical transmission line subsequent to switching the third transmitter and the third receiver to the isolated fourth optical transmission line; and

reversing the isolated fourth optical transmission line.

5. The method of switching optical transmission lines according to claim 1 wherein said isolating is accomplished by blocking optical signals from the second transmitter to the second transmission line and to the second receiver from the second transmission line.

Sub  
alt }

6. The method of switching optical transmission lines according to claim 5 wherein said blocking is accomplished by gating of the optical signals.

5 7. The method of switching optical transmission lines according to claim 5 wherein said blocking is accomplished by failing to perform electronic to optical conversion of the optical signals.

10 8. The method of switching optical transmission lines according to claim 5 wherein said blocking is accomplished by processing of electrical signals representing the optical signals.

9. The method of switching optical transmission lines according to claim 1 further comprising:

15 storing correspondence data on the first transmitter and the first receiver as well as the second transmitter and the second receiver for ascertaining original connections subsequent to said switching.

~~10. A system for switching between a first optical transmission line and a second optical transmission line, comprising:~~

20 a pair of a first transmitter and a first receiver connected to said first optical transmission line for transmitting and receiving first optical signals to and from said first optical transmission line;

a pair of a second transmitter and a second receiver connected to said second optical transmission line for transmitting and receiving second optical signals to and from said second optical transmission line;

25

~~a monitor connected to said first optical transmission line for detecting a fault in said~~  
first optical transmission line;

a first line isolator connected to said second optical transmission line for isolating said  
second optical transmission line from said second transmitter and said receiver so as to have  
5 no traffic on the second optical transmission line; and

a switch connected to said first optical transmission line and said second optical  
transmission line for switching said first transmitter and said first receiver to said isolated  
second optical transmission line.

10 11. The system for switching optical transmission lines according to claim 10 wherein said  
switch switches said second transmitter and said second receiver to said first optical  
transmission line, the second optical signals being low priority data.

12. The system for switching optical transmission lines according to claim 11 further  
15 comprising:

a third optical transmission line;

a pair of a third transmitter and a third receiver connected to said third optical  
transmission line for transmitting and receiving third optical signals to and from said third  
optical transmission line in an opposite direction to that of the first optical signals;

20 a fourth optical transmission line;

a pair of a fourth transmitter and a fourth receiver connected to said fourth optical  
transmission line for transmitting and receiving fourth optical signals to and from said fourth  
optical transmission line in an opposite direction to that of the second optical signals;

said line isolator also connected to said fourth optical transmission line for isolating  
25 said fourth optical transmission line so as to have no traffic on said fourth optical transmission  
line; and

~~said switch further connected to said third optical transmission line and said fourth~~  
optical transmission line for switching said third transmitter and said third receiver to said  
isolated fourth optical transmission line and switching said fourth transmitter and said fourth  
receiver to said third optical transmission line subsequent to switching said third transmitter  
5 and said third receiver to said isolated fourth optical transmission line.

13. The system for switching optical transmission lines according to claim 2 further  
comprising:

a third optical transmission line;

10 a pair of a third transmitter and a third receiver connected to said third optical  
transmission line for transmitting and receiving third optical signals to and from said third  
optical transmission line in an opposite direction to that of the first optical signals;

a fourth optical transmission line;

15 a pair of a fourth transmitter and a fourth receiver connected to said fourth optical  
transmission line for transmitting and receiving fourth optical signals to and from said fourth  
optical transmission line in an opposite direction to that of the second optical signals;

said line isolator also connected to said fourth optical transmission line for isolating  
said fourth optical transmission line simultaneously as the second optical transmission line is  
isolated so as to have no traffic on said fourth optical transmission line; and

20 said switch further connected to said third optical transmission line and said fourth  
optical transmission line for switching said third transmitter and said third receiver to said  
isolated fourth optical transmission line simultaneously as said first transmitter and said first  
receiver are switched to said isolated second optical transmission line, said switch switching  
said fourth transmitter and said fourth receiver to said third optical transmission line  
25 subsequent to switching said third transmitter and said third receiver to said isolated fourth  
optical transmission line.

~~14. The system for switching optical transmission lines according to claim 10 wherein said line isolator blocks transmission of optical signals from said second transmitter to said second transmission line and to said second receiver from said second transmission line.~~

5

Sub  
at

15. The system for switching optical transmission lines according to claim 14 wherein said line isolator further comprises an optical gate.

10 16. The system for switching optical transmission lines according to claim 14 wherein said line isolator further comprises an electronic-to-optical converter.

15 17. The system for switching optical transmission lines according to claim 14 wherein said line isolator further comprises an optical-to-electronic converter for converting an optical signal to an electrical signal and a processing unit connected to said optical-to-electronic converter for processing the electrical signal.

18. The system for switching optical transmission lines according to claim 9 further comprising:

20 a storage unit connected to said switch for storing correspondence data on said first transmitter and said first receiver as well as said second transmitter and said second receiver for ascertaining original connections subsequent to switching.

~~19. A optical protection switching apparatus for switching optical transmission lines between transmitters and receivers, comprising:~~

25 a monitor for monitoring a fault in a first optical transmission line and generating a fault signal;

~~a line isolator for isolating a second optical transmission line so that no traffic runs on the~~  
isolated second optical transmission line;

a switch for switching optical transmission lines; and

a controller connected to said monitor, said line isolator and said switch for activating said line  
5 isolator in response to the fault signal and then coordinating said switch to establish  
~~connections to the isolated second optical transmission line.~~

Sub 20. The optical protection switching apparatus according to claim 19 wherein said switch is  
a four-in-four-out optical switch.

21. The optical protection switching apparatus according to claim 19 wherein said switch is  
a two two-in-two-out optical switch.

22. The optical protection switching apparatus according to claim 19 wherein said switch  
15 further comprises one one-in-two-out optical switch, two two-in-one-out switch and an optical  
splitter.

23. The optical protection switching apparatus according to claim 19 wherein said switch  
20 further comprises two two-in-two-out optical switches.

24. The optical protection switching apparatus according to claim 19 wherein said line isolator  
is an optical gate.

23. The optical protection switching apparatus according to claim 19 wherein said line  
25 isolator is an electronic-to-optical converter.

25. The optical protection switching apparatus according to claim 19 wherein said line isolator further comprises an optical-to-electronic converter for converting an optical signal to an electrical signal and a processing unit connected to said optical-to-electronic converter for processing the electrical signal.

5

26. The optical protection switching apparatus according to claim 19 further comprising:  
a storage unit connected to said switch for storing correspondence data on the transmitters and the receivers subsequent to switching.

10

add  
a6